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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/928,893 09/12/97 HEIKKILA

H 85940/15

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HM22/0627

EXAMINER

NAFF, D

ART UNIT

PAPER NUMBER

1651

DATE MAILED:

06/27/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No. <u>08/929873</u>	Applicant(s) <u>Heikkila et al</u>	
Examiner <u>K. Abbott</u>	Group Art Unit <u>1657</u>	

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

## Status

- ☒ Responsive to communication(s) filed on 5/14/01 + 5/18/01
- ☐ This action is FINAL.
- ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- ☒ Claim(s) 1, 3-13, 15, 16 + 19-31 is/are pending in the application.
- Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- ☒ Claim(s) 1, 3-13, 15, 16 + 19-31 is/are rejected.
- ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
  - ☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been received.
  - ☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_
  - ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

## Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 33 (filed 5/14/01)
- ☐ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other \_\_\_\_\_

Office Action Summary

This office action is supplemental to the office action of 5/16/01 in response to a preliminary amendment of 5/18/01 and Information Disclosure Statement of 5/14/01.

The other documents listed on form PTO-1449 of 5/14/01 list  
5 abstracts from Chemical Abstracts when listing journal articles.  
However, only copies of the journal articles have been supplied. The  
abstracts from Chemical Abstracts are separate documents from a separate  
source, and must be listed separate from the journal articles and copies  
of the pages from Chemical Abstracts listed must be supplied. Therefore,  
10 the Chemical Abstracts citations have been deleted from the form. While  
copies of abstracts have been supplied, these copies are from a source  
other than Chemical Abstracts, and are not copies of the pages listed as  
being from Chemical Abstracts. If applicants want the abstracts from  
Chemical Abstracts to be made of record, the abstracts must be listed on  
15 form PTO-1449 as documents separate from the journal articles, and copies  
of the pages from Chemical Abstracts must be supplied.

The citation of an abstract of JP 9703090 has been deleted from form  
PTO-1449 since no information is provided as to the source of the  
abstract and the date of publication of the abstract that will enable one  
20 to locate the abstract.

The preliminary amendment of 5/18/01 has been entered. The  
amendment added claims 23-31.

Claims examined on the merits are 1, 3-13, 15, 16 and 19-31 which  
are all claims in the application.

25 The following rejections are in addition to those in the previous  
office action of 5/16/01.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 23-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification fails to disclose a method having scope, steps and conditions as now required by claims 23-31. The specification, discloses (page 1, lines 5-11) that the invention is a process for simultaneous production of xylitol and ethanol using a hydrolyzed lignocellulose-containing material as a starting material. There is no disclosure of a method broadly directed to processing of lignocellulose-containing material as in line 1 of claim 23, and of processing lignocellulose-containing material other than by hydrolyzing to produce a solution as encompassed in lines 8 and 9 of claim 23. The specification does not disclose processing a lignocellulose-containing material comprising xylose and hexose from a xylan-containing matter" as in the preamble of claim 23. In view of the specification, the lignocellulose-containing material contains xylan, and hexose and xylose are not present until after the lignocellulose-containing material is hydrolyzed. The specification fails to recite a Markush group as in the preamble of claim 23. Disclosure of wood and softwood being an alternative to hardwood is not found. Additionally, the hardwoods listed are softwoods. Disclosure of woodpulp, sulphite cooking liquor and liquids from any of the preceding being separate members of a group as claimed is not found.

Disclosure is not found of decanting being an alternative to filtration and centrifugation as in line 10 of claim 23.

Disclosure of a combination of steps from line 21 to the last line of claim 23 is not found. In particular, there is no disclosure of  
5 producing a xylitol distillate by distilling the clarified solution. A distillate results from condensing vapor resulting from distilling. The specification contains no disclosure of converting xylitol to a vapor during distilling and then condensing the xylitol vapor to produce a distillate.

10 In claim 24, all of the alternative processings recited as producing the solution in line 9 of claim 23 is not found in the specification.

The specification fails to recite a Markush group as in claim 26 where *Candida tropicalis* is alternative to a strain of *Candida tropicalis*.

15 Producing arabinose and fermenting to produce arabinitol as in claim 30 is not readily apparent from the specification. While examples such as 2 disclose arabinose being present before fermentation, there is no disclosure of arabinitol being produced during fermenting to produce ethanol and xylitol.

20 Steps and conditions as required by claim 31 are not found in the specification. Page 9, lines 4-13, does not describe a method as required by claim 31 of producing an extracted biomass comprising hexosans and hexoses.

Claims 23-31 are rejected under 35 U.S.C. 112, first paragraph, as  
25 containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or

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with which it is most nearly connected, to make and/or use the invention.

The specification fails to describe enabling conditions for embodiments of distilling to produce a xylitol distillate as required in claim 23, carrying out all of the alternative processings of claim 24 to produce a xylose-rich solution as in claim 23, producing arabinitol from arabinose by fermenting as in claim 30, and carrying out the process of claim 23 with steps as required by claim 31. The specification either does not mention the embodiment or provides so little description of working conditions for the embodiment that one would not know how to perform the embodiment from the description provided.

Claims 1, 3-13, 15, 16 and 19-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 7 of claim 1 and where recited in other claims "xylitol-rich" is uncertain as to meaning and scope. Being "rich" in xylitol is relative and subjective. While the specification may recite "xylitol-rich", this does not provide the term with definite metes and bounds in the claims. The term "xylose-rich" in line 10 of claim 23 and where recited in other claims is indefinite for the same type of reason as "xylitol-rich" as set forth in the paragraph bridging pages 5 and 6 of the previous office action of 5/16/01.

In the preamble of claim 23, "lignocellulose-containing material comprising xylose and hexose" is confusing since in view of the specification the xylose and hexose are in a hydrolyzed lignocellulose-containing material. The xylose and hexose are not present until after

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hydrolyzing, and not before hydrolyzing as required in the claim preamble. The preamble of claim 23 is unclear as to the relationship of the xylan-containing matter to the lignocellulose-containing material. In view of the specification, the lignocellulose-containing material  
5 contains xylan, and is not obtained from xylan-containing matter as the preamble requires. Processing the lignocellulose-containing material to produce xylose and hexose as in lines 8 and 9 of claim 23 is confusing since the claim preamble requires the lignocellulose-containing material to contain xylose and hexose.

10 The Markush group of xylan-containing matter in the preamble of claim 23 is confusing and unclear. Reciting "hardwood as", "plant constituents as" and "grain hulls as" makes unclear as to the members in the group. The meaning and scope of "sulphite cooking liquor" is uncertain since this member has not been defined in the specification.  
15 For the same type of reason "liquids derived from any of the preceding" is unclear.

In lines 21-27 of claim 23, "xylitol distillate" is uncertain as to meaning and scope since the specification does not describe such a distillate. Is "distillate" being used in the claim for its conventional  
20 meaning of a condensed vapor from distilling or does the term have some other meaning?

In line 20 of claim 23, "e.g." makes unclear as to the purpose of reciting specific forms of clarification, and whether the specific forms are to be patentably limiting.

25 Requiring the alternative processings of claim 24 to carry out the processing in lines 8 and 9 of claim 23 is confusing since the

specification fails to disclose all the claimed alternative processings to produce xylose and hexose.

Claim 31 is confusing and unclear how the steps of the claim are carried out together with the steps of claim 23. In view of the specification (page 9, lines 4-5), the process of claim 31 is a complete process that is alternative to the process of claim 23. In this case, claim 31 should be in independent form since the process of claim 31 replaces the entire process of claim 23 with steps different than performed in claim 23 such that the process of claim 23 no longer exists. A dependent claim properly dependent on claim 23 should further limit the process of claim 23 rather than replace the process of claim 23 with a completely different process that precludes the process steps of claim 23.

Claims 23-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Heikkila et al (5,081,026).

Heikkila et al disclose (paragraph bridging cols 2 and 3) fermenting a hydrolyzed lignocellulose-containing material to produce a hydrolyzate containing xylose and hexoses, fermenting the hydrolyzate with yeast to produce a fermented product containing xylitol, ethanol and yeast, removing yeast, removing ethanol by evaporation or distillation, chromatographically separating a xylitol-rich fraction and recovering xylitol from the xylitol-rich fraction by crystallizing the xylitol.

The present claims do not contain limitations to which the arguments in the preliminary amendment and accompanying declaration of 7/12/99 are directed.



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Claims 23-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heikkila et al in view of Chahal (5,047,332):

Heikkila et al is described above.

Chahal discloses (col 5, lines 20-29) producing ethanol for use as  
5 fuel from lignocellulose-containing biomass by fractionating lignocellulose into cellulose, lignin and hemicelluloses, hydrolyzing the cellulose with cellulase to produce glucose and fermenting the glucose with yeast to produce ethanol.

It would have been obvious to obtain ethanol in the process of  
10 Heikkila et al as suggested by Chahal by hydrolyzing cellulose of lignocellulose to glucose so that yeast can ferment the glucose to ethanol. The xylose obtained by Heikkila et al results from hemicellulose (col 1, lines 55-61). It would have been apparent from Chahal that lignocellulose material contains cellulose in addition to  
15 hemicellulose, and the cellulose can be hydrolyzed with cellulase to glucose for fermenting to ethanol. Thus, it would have been expected that cellulose in addition to hemicellulose is present in the lignocellulose material used by Heikkila et al (col 3, lines 51-68) as a starting material, and it would have been obvious to hydrolyze the  
20 cellulose to glucose to provide production of ethanol for use as suggested by Chahal. Producing xylitol and ethanol in separate steps as in claim 31 would have been a matter of obvious choice depending on individual preference and convenience within the ordinary skill of the art.

25 The present claims do not contain limitations urged to distinguish the invention over the prior art in the response of 7/12/99.

Claims 23-31 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. 5,081,026 in view of Chahal for reasons set forth above in the 35 U. S. C. 103 rejection.

5 It would have been obvious to produce ethanol in the claimed process of the patent to obtain ethanol for use as suggested by Chahal by hydrolyzing cellulose in the starting material with cellulase to obtain glucose that can be fermented to ethanol.

The THREE MONTH PERIOD for response to the office action of 5/16/01  
10 is restarted to begin from the mailing date of this supplemental action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Naff whose telephone number is (703) 308-0520. The examiner can normally be reached on Monday-Thursday and every other Friday from about 8:30 AM to about 6:00  
15 PM.

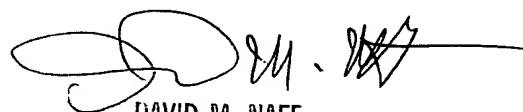
If attempts to reach the examiner by telephone are unsuccessful, a message can be left on voice mail.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn, can be reached at telephone number  
20 (703) 308-4743.

The fax phone number is (703) 305-3014 or 308-4242.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0196.

25 DMN  
6/26/01

  
DAVID M. NAFF  
PRIMARY EXAMINER  
ART UNIT 1651